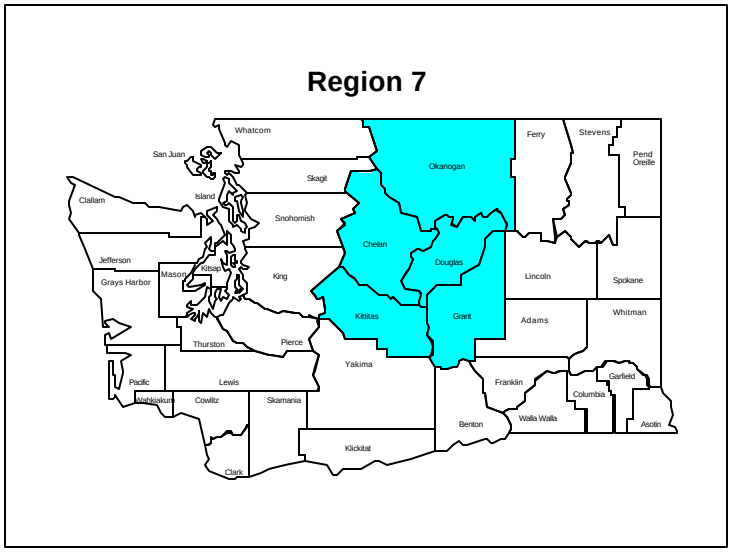
Region 7

Region 7 includes the counties of Chelan, Douglas, Grant, Kittitas and Okanogan in the north-central section of Washington.

The terrain ranges from rugged mountains in the west, north and south, to fertile valleys in the central region. The Columbia River meanders through the region, providing part of the boundaries for four counties.



The population is more rural than most areas of the state, and much more diverse. Most of the population lives in the largest cities of each county. The region has a significant Hispanic population, much of which works in the fields and orchards tending and harvesting fruit and vegetables. The region grew faster than the state as a whole; most of the growth during the 1990s was from people moving into the region.

Agriculture is the base of the region's economy. Washington is the largest producer nationwide of apples, cherries, and pears; this region is a top producer of each of these tree fruits. According to 1997 Census of Agriculture, this region has three of the top four apple producing counties in the nation – Grant, second in the nation; Okanogan, third; and Chelan, fourth. Tree fruit production and affiliated industries such as cold storage and food processing provide the majority of jobs in the region, which also has a significant manufacturing sector, primarily in timber and forest-products related industries. Government employment also provides significant and stabilizing employment in an economy subject to the influences of national and international markets.

Additionally, four of the five counties – Chelan, Douglas, Grant, and Okanogan – are considered distressed because their unemployment rate has been at least 20 percent higher than the state average for the past several years (most recently, the 2000-2002 period.)

The Counties

Chelan County[1]

Chelan County has an area of 2,915 square miles, the third largest county in Washington.

Its population in 2000 was 66,616, 17th largest in the state. During the 1990s, the population grew by more than 26 percent; about seven of every 10 new residents in the

1990s moved into Chelan County. Population density is 23 persons per square mile, ranking the county 23rd in the state.

More than one-half of Chelan County residents live in cities, with the majority in Wenatchee, the largest city. Other cities include Cashmere, Leavenworth, Chelan, and Entiat.

About 90 percent of the county is in the Wenatchee National Forest. Much of the county has dense, rugged, and mountainous terrain. Among the higher elevations in the county are Mount Stuart, 9,415 feet, and Cashmere Mountain, 8,520 feet, in the southern part of the county, and Clark Mountain, 8,576 feet, and Pyramid Mountain, 8,245 feet, in the north-central part of the county. The remaining area is low-lying valleys.

Because of its higher elevations, Chelan County gets its share of runoff from precipitation and melting snow. Runoff from the western parts of the county forms the Chiwana, White, and Little Wenatchee Rivers, all of which flow southeast and feed into Lake Wenatchee. The Wenatchee River continues from there, flowing further southeast to the Columbia River near Wenatchee. The largest lake in the county is 55-mile-long Lake Chelan, known to run to depths of 1,500 feet.

Chelan County is on the eastern crest of the Cascade Mountain Range. Skagit, Snohomish, and Kittitas Counties provide its western boundary, and Okanogan and Douglas Counties provide its eastern boundary.

Agriculture, particularly the tree fruit industry, heavily influences the Chelan County economy. The areas' first settlers brought saplings for their personal use, finding the trees took well to the semi-arid climate and soil. They quickly established tree nurseries, planting the first commercial apple orchard in the early 1880s. Chelan County is one of the top apple producing counties in the nation (fourth largest, according to the 1997 Census of Agriculture). Beyond growing and harvesting fruit, manufacturing industries, such food processing and aluminum production, became important to the county and regional economy. The influence of international markets, however, hurt these sectors in recent years. Although there has been a move away from agriculture and manufacturing, these two sectors will shape the economy of Chelan County in the coming years.

Douglas County[2]

Douglas County has an area of 1,817 square miles, ranking it 17th in size among Washington's 39 counties.

Its population in 2000 was 32,603 residents, 26th largest in the state. Nearly two-thirds of the population growth in the 1990s is attributable to people moving into the county. Douglas County has a population density of 18 people per square mile, also 26th in the state.

In contrast to Chelan County, its neighbor to the west, more than two of every three Douglas County residents live in unincorporated areas. The largest city is East Wenatchee; other cities are Bridgeport, Mansfield, Rock Island, Waterville, and part of Coulee City.

Douglas County's boundary to the north (Okanogan County) and to the west and southwest (Chelan County) is formed by the Columbia River. Its eastern and southeastern boundary is Grant County; a significant portion of this boundary roughly mirrors Banks Lake, the former channel of the Columbia River.

The western part of Douglas County along the Columbia River is one of hills and canyons, where the terrain begins to merge with the foothills of the Cascade Mountains. This area, near East Wenatchee, is conducive to tree fruit production. The central and eastern parts of Douglas County is rolling hills and flat, open land suitable for wheat and other grains.

Besides the Columbia River, the county's major tributaries are Douglas Creek, East and West Foster Creek, McCarteney Creek, and Rock Island Creek. Among the county's major lakes are Lake Entiat, Lake Pateros, and Rufus Woods Lake, formed by backwaters from dams on the county's western border. Grimes Lake and Jameson Lake are both in the county's interior.

Like Chelan County, agriculture heavily influences the Douglas County economy. Seasonal employment in the tree fruit industry more often than not is the driving force because of the amount of labor required to grow and harvest fruit. In 2000, the two counties employed close to 10,000 farm workers. More than one-fifth of all employment in Chelan and Douglas Counties is on farms. While apples are the chief product of Douglas County's orchards, other fruits such as sweet cherries, pears, peaches, apricots, nectarines, and plums are grown there.

Grant County[3]

Grant County has an area of 2,660 square miles, fourth largest in the state.

Its population in 2000 was 74,698, 13th largest among the state's 39 counties. It grew more than 36 percent in the 1990s, much faster than the state as a whole (just over 21 percent). There are just over 28 persons per square mile in Grant County, making it one of the least densely populated. The county's population is nearly evenly split between cities and unincorporated areas.

The largest city is Moses Lake, with one out of every five county residents. The second largest city is Ephrata, with a tenth of the county's population.

Kittitas County bounds Grant County region to the west, Douglas County bounds it to the west, Okanogan County bounds it to the north, Lincoln and Adams Counties bound it to the east, Franklin, Benton, and Yakima Counties bounds it to the south.

Grant County is part of the Columbia Basin in eastern Washington. The county has rich and fertile valleys along with gentle rolling hills and grassy plains. It enjoys a generally warm, semi-arid climate and long periods of clear and sunny weather. As a result, Grant County has evolved into one of the premier agricultural centers in both the state and the nation.

An extensive man made irrigation network promotes agricultural productivity; 30-mile long Banks Lake, as well as a series of lesser lakes, was formed by controlling the Columbia River's flow at Grand Coulee Dam. Water from these lakes flows southward into the county via rivers, creeks, and man made canals; much of the overflow empties into Moses Lake.

Agriculture is the largest employer in Grant County; production is diverse, with a large number of orchards as well as field crops. Produce ranges from apples and cherries to wheat to potatoes and many other vegetables. Agriculture is the force behind several other industries including food processing, trucking and warehousing, and much of wholesale trade. Taken together, these industries employ over 40 percent of the area's workers. In recent years, there has been strong diversification in manufacturing, with rapid growth in industries such as metal fabrication, instruments, computer-chip components, and navigational equipment.

Because farm work occupies so much of the labor force and it is relatively low-wage work, Grant County's income indicators are low; for example, the county's median household income is considerably less than the statewide average.

Kittitas County[4]

Kittitas County has an area of 2,297 square miles, eighth in size among Washington counties.

In 2000, the county's population was 33,362, ranking it the 25th in the state. Of the county's 6,637 new residents during the 1990s, more than five in six moved into the county. The population density is about 15 people per square mile, making it the 28th most densely populated.

While just two in five county residents lives in unincorporated areas, they grew at nearly double the rate of cities during the 1990s. Kittitas has five cities; the largest is Ellensburg, which accounts most of the county's incorporated population. Other cities include Cle Elum, Kittitas, Roslyn, and South Cle Elum. Due to the presence of Central Washington University, the county's median age is five years younger than the state as a whole.

Kittitas County is in the center of the state, stretching from the Cascade Mountains east to the Columbia River. Chelan and Douglas Counties form its boundary to the north, Yakima County to the south, and Grant County to the east. The Pacific Crest Trail, high in the Cascades, forms its boundary to the west with King County.

The county's terrain is rugged and heavily forested wilderness in the northwest corner. Extending from the Cascade Range are the Wenatchee Mountains, which run the length of the county's northern border. The Saddle Mountains, and the Manastash and Umtanum ridges, form the county's southern border with Yakima County. In the southeast quadrant of the county is the Kittitas Valley

At higher elevations in the county's northwest corner, a series of major rivers carry rain and snowmelt into the Kittitas Valley. The Cooper and Waptus Rivers feed into the Cle Elum River. The North, West, and Middle forks feed into the Teanaway River. From the Wenatchee Mountains run the Naneum and Caribou creeks, which join the Yakima River south of Ellensburg. The Cle Elum and Teanaway rivers feed into the Yakima River, which flows across the remaining county expanse before winding south into Yakima County.

Even though it has a rural, natural resource driven heritage (logging, mining, agriculture), Kittitas County's economy has diversified. The natural resource-based industries continue to provide important employment and remain a vital part of the local economy. Agriculture in the rich Kittitas Valley is thriving; its employment accounted for 7 percent of all jobs in 2000. Within the county's agricultural sector, most jobs are in crop production, including tree fruits, oats, hay, and potatoes. Kittitas County is the largest producer of oats and hay in the state, and is home to a large number of beef and dairy cattle. The county's strongest industry sector is government, with 31 percent of non-farm jobs; Central Washington University at Ellensburg boosts the county's government sector.

Okanogan County[5]

Okanogan County, with an area of 5,281 square miles, is the largest county in Washington State, and the third largest in the continental United States. It covers nearly 8 percent of the state's total area.

In 2000, the county's population was 39,564. During the 1990s, it grew 18.6 percent, just under the state average. Sixty percent of the population lives in unincorporated areas. The largest city is Omak, followed by Okanogan and Brewster. About one-half of the Colville Indian Reservation is in the county's southwest quarter.

Population density is 7.5 people per square mile, making Okanogan County the sixth least densely populated, and one of the most rural counties in the state.

Okanogan County is in the north-central part of the state. Whatcom, Skagit, and Chelan Counties provide its border to the west, Ferry County to the east, and Douglas County to the south. Its northern boundary is British Columbia, Canada.

The western half of the county is the dense, rugged, and mountainous terrain of the Okanogan National Forest. Some of the higher elevations in Okanogan County include Oval Peak, 8,800 feet, Gardner Mountain, 8,760 feet, Remmel Mountain, 8,690 feet, and Tiffany Mountain, 8,242 feet. Similar terrain dominates the northeast corner of the

county; there, the terrain rises as high as 7,258 feet above sea level at the summit of Bonaparte Mountain. From the north, the terrain descends into rolling hills, grassy ranges and fertile valleys that extend through the center of the county.

Melting snow and rain form a network of rivers and lakes that bring water from the higher elevations into the central valley. Near the U.S.-Canadian border are Palmer, Wannacut, Spectacle, Whitestone, and Blue lakes, as well as the dominant Osoyoos Lake. The Okanogan River is fed by numerous rivers and streams as it flows south from Osoyoos Lake toward the Columbia River. Omak Lake, in south-central Okanogan County, is another significant body of water.

Okanogan County's large area and abundant natural resources obscure an economy struggling to make the transition from an extractive, resource base to a more diversified one with large trade and services components. Much of its workforce remains in traditional industries such as lumber and wood products, agriculture, and wholesale trading of agricultural products; in recent years, services industries have gained headway. Agriculture is the largest industry sector in the county, with one quarter of the jobs; the overwhelming percentage is in crop production, primarily apples and cherries.

Apple production heads the list of the county's major industries, but it is facing stiff competition internally from commodities like cherries and externally from countries with lower labor costs. Recently, manufacturing has seen difficult times as the fruit packing industry has faced closures. Two-thirds of the county is forest; lumber and wood products industries are prominent. Historically, the forest products industry has been 90 percent of manufacturing sector; now it is about 70 percent.

Population and Demographics

As shown in Table 1, below, Region 7's population grew faster than the state as a whole during the 1990s. Grant County grew much faster than the state average. Of the five counties in the region, only Okanogan County grew more slowly than the state average. Much of the region's growth was from people moving its counties. The region is expected to grow at about the state average through the year 2025, with Douglas County leading the way.

Table 1. Region 1 Population Growth

	1990 Population	2000 Population	% Change	2025 (Projected)	% Change from 2000
Chelan	52,250	66,166	26.6%	90,461	36.7%
Douglas	26,205	32,603	24.4%	47,428	45.5%
Grant	54,798	74,698	36.3%	98,395	31.7%
Kittitas	26,725	33,362	24.8%	43,999	31.9%
Okanogan	33,350	39,564	18.6%	49,410	24.9%
Total	**193,328**	**246,393**	**27.4%**	**329,693**	**33.8%**
Washington State	*4,866,663*	*5,894,121*	*21.1%*	*7,975,471*	*35.3%*

Source: U.S. Census Bureau, Census 2000; *2002 Population Trends*, State of Washington Office of Financial Management, Forecasting Division; *Washington State County Population Projections For Growth Management*, Intermediate Projection, State of Washington Office of Financial Management, Forecasting Division, January 2002.

Region 7 is much more rural than the rest of the state. Just over half of the region's residents live in densely populated areas, primarily around Wenatchee in Chelan County, East Wenatchee in Douglas County, Moses Lake in Grant County, and Ellensburg in Kittitas County; see Table 2, below. The current growth pattern, both urban and rural, affects how agencies prepare for emergencies as changes in the population and development can increase risks associated with hazards.

Table 2. Urban/Rural Populations, 2000

	Urban	Rural
Chelan	41,311	25,304
Douglas	22,626	9,977
Grant	39,377	35,321
Kittitas	19,751	13,611
Okanogan	8,466	31,098
Total	**131,531**	**115,311**
Percentage	53.3%	46.7%
Washington State	*81.9%*	*18.1%*

Source: U.S. Census Bureau, Census 2000: Population and Housing by Urban Classification.

The ability to prepare for and recover from a disaster varies among population groups. Research on various population groups and disasters found that it took some populations longer to recover from a disaster for a variety of reasons. These population groups include minorities, people with language barriers, the disabled, the elderly, and those with low income.

Ethnic Groups

People from non-white population groups generally experience longer recoveries due to lower incomes, savings and insurance; their difficulty accessing insurance; and their using aid and relief organizations differently than was anticipated. Language and cultural differences can pose difficulties in some populations understanding and implementing preparedness and mitigation actions as well as accessing and using available disaster relief.

Table 3, below, shows that Region 7, overall, is much more diverse than the state as a whole. The region has a large Hispanic population; a majority works in the fields and orchards, picking and harvesting fruit and vegetables. Okanogan also has a significant Native American population. The growth rate of most ethnic groups outpaced that of the white population during the 1990s.

Table 3. Population by Ethnic Group

	Hispanic/ Latino	Asian	African American	Native American	Total
Chelan	19.3%	0.7%	0.3%	1.0%	21.3%
Douglas	19.7%	0.5%	0.3%	1.1%	21.6%
Grant	30.1%	0.9%	1.0%	1.2%	33.2%
Kittitas	5.0%	2.2%	0.7%	0.9%	8.8%
Okanogan	14.4%	0.4%	0.3%	11.5%	26.6%
Washington State	*7.5%*	*5.5%*	*3.2%*	*1.6%*	*17.8%*

Source: U.S. Census Bureau, Census 2000.

Region 7's diversity shows in the percentage of people who do not speak English as their primary language at home and who speak English less than very well, as shown in Table 4, below.

More than one in four people in Grant County speak a language other than English at home, primarily Spanish; the rate is nearly one in five in Chelan and Douglas Counties, and one in six in Okanogan County. A smaller, but still significant percentage of the people in Chelan, Douglas, and Grant Counties speak English less than very well. This means that a significant percentage of the population may have a language barrier that prevents them from preparing for a disaster, responding to an event, or applying for assistance after a disaster.

Table 4. Primary Language Spoken at Home

	Language Other Than English	*English Less Than Very Well*	Spanish	*English Less Than Very Well*	Other Indo-European	*English Less Than Very Well*	Asian-Pacific Islander	*English Less Than Very Well*
Chelan	**19.6%**	**11.2%**	18.0%	10.8%	1.1%	0.2%	0.4%	0.2%
Douglas	**19.5%**	**11.0%**	17.5%	10.2%	1.3%	0.6%	0.6%	0.2%
Grant	**28.3%**	**15.7%**	25.2%	14.3%	2.5%	1.2%	0.5%	0.2%
Kittitas	**7.7%**	**3.6%**	4.5%	2.3%	1.5%	0.4%	1.5%	0.8%
Okanogan	**15.1%**	**7.6%**	12.7%	7.2%	0.8%	0.1%	0.5%	0.1%
WA State	***14.0%***	***6.4%***	*5.8%*	*2.8%*	*3.2%*	*1.3%*	*4.4%*	*2.2%*

Source: U.S. Census Bureau, Profile of Selected Social Characteristics: 2000

Disabled People

Community preparedness activities often do not consider the needs of people with disabilities. They have complex challenges because of hearing, sight, mobility, or mental impairments. Additionally, a significant percentage of working-age people with disabilities do not work. These factors make it difficult for the disabled to prepare in advance of a disaster

Table 5, below, shows that one in five people of working age have a disability that does not require them to be institutionalized. About half have jobs; only Chelan and Kittitas Counties have populations of working disabled larger than the state average; the rest have a lower percentage. Between 40 and 50 percent of retirement-age people in the region have a disability

Table 5. Non-Institutionalized Disabled Population

	21 to 64 Years		65 Years and Older
	% of Population	% Employed	% of Population
Chelan	18.4%	57.4%	42.8%
Douglas	18.7%	55.4%	39.4%
Grant	21.1%	48.4%	43.3%
Kittitas	18.1%	59.8%	41.2%
Okanogan	20.3%	42.1%	48.0%
Washington State	*17.7%*	*57.6%*	*42.3%*

Source: U.S. Census Bureau, Profile of Selected Social Characteristics: 2000.

Senior Citizens

Preparedness and recovery activities may overlook senior citizens; their age could lead them to have difficulty after a disaster, perhaps not qualify for loans, or become disabled because of the disaster. Table 6, below, shows the counties of Region 7 have populations of retirement age people at about the same percentage as the state as a whole.

Table 6. Population Over Age 65

	% of Total Population
Chelan	13.9%
Douglas	12.7%
Grant	11.5%
Kittitas	11.6%
Okanogan	14.0%
Washington State	*11.2%*

Source: U.S. Census Bureau, Census 2000

Poverty

The amount of money people have influences what type of housing they live in, whether they can engage in mitigation actions, and how long it takes to recover. Income is based on a number of factors, including the individual, the economy, availability of jobs, educational opportunity, among others. Expenses can vary by location – rural places are cheaper to live but have fewer jobs, while urban areas can be costly, even for renters.

Table 7, below, shows that all counties in the region have a greater percentage of people living in poverty than the state as a whole. Contributing to this are agriculture-based economies with abundant part-time, seasonal and low-paying jobs; even the fast growing trade and services sectors in these counties have a preponderance of low-paying jobs.

Table 7. Poverty Rates

	% of Total Population	Children Under 18	Over Age 65
Chelan	12.4%	16.0%	7.4%
Douglas	14.4%	21.0%	6.9%
Grant	17.4%	22.3%	9.4%
Kittitas	19.6%	15.6%	8.2%
Okanogan	21.3%	28.2%	10.4%
Washington State	*10.6%*	*13.2%*	*7.5%*

Source: U.S. Census Bureau, Profile of Selected Economic Characteristics: 2000.

School Children

While children overall are captured in figures elsewhere in this profile, the number of children attending school is a concern because many of the school buildings they spend considerable time in each day are older and potentially more vulnerable to the effects of disaster. Table 8, below, shows the population of school-age children in Region 7; it does not show the number that are in potentially vulnerable buildings.

Table 8. School Enrollment – Kindergarten through High School

	Total	Kindergarten	Elementary	High School
Chelan	14,315	1,110	8,635	4,570
Douglas	7,284	548	4,395	2,341
Grant	17,754	1,326	11,042	5,386
Kittitas	5,204	372	3,097	1,735
Okanogan	8,656	669	5,237	2,750
Total	**57,051**	**4,025**	**32,406**	**16,782**
Washington State	*1,127,448*	*82,637*	*697,192*	*347,619*

Source: U.S. Census Bureau, Profile of Selected Social Characteristics: 2000.

Housing

Washington's Growth Management Act encourages local jurisdictions to direct population growth into urban growth areas, where urban services can support growth and higher densities. It also requires communities to incorporate mitigation by protecting critical areas and restricting development in areas such as those that are frequently flooded or subject to geologic hazards. Eliminating or limiting development in hazard-prone areas can reduce vulnerability to hazards and the potential loss of life and injuries and property damage.

Table 9, below, provides a breakdown by county of various housing characteristics.

Table 9. Housing Development

	Single-Family	Multi-Family	Mobile Homes	Other
Chelan	69.2%	17.7%	12.4%	0.7%
Douglas	64.6%	13.9%	20.2%	1.1%
Grant	56.7%	12.5%	28.6%	2.1%
Kittitas	62.3%	24.4%	11.9%	1.5%
Okanogan	68.8%	8.2%	20.7%	2.3%
Washington State	*65.4%*	*25.6%*	*8.5%*	*0.5%*

Source: U.S. Census Bureau, Profile of Selected Economic Characteristics: 2000.

The year housing was built is important for mitigation. The older a home is, the greater the risk natural disasters pose to it. Homes constructed after 1980 are more likely to withstand damage from hazards such as floods, high winds, snow loads, and earthquake because they were built with modern building codes. Table 10, below, shows the general age of Region 7's housing.

The age of the housing stock in this region closely mirrors the state average.

Table 10. Housing – Year Built

	Pre-1939 – 1959	1960 – 1979	1980 – 2000
Chelan	35.0%	27.8%	37.2%
Douglas	26.7%	36.8%	36.6%
Grant	31.2%	33.5%	35.2%
Kittitas	32.6%	30.8%	36.6%
Okanogan	33.0%	31.4%	35.7%
Washington State	*29.4%*	*32.7%*	*37.9%*

Source: U.S. Census Bureau, Profile of Housing Characteristics 2000.

Household Income

Median household income is an indicator of a region's economic stability. It compares economic areas as a whole, and it generally shows distribution of income among the population. Median household income indicates that point where half of all households have a higher income, and half have a lower income.

Table 11, left, shows that median household income in all counties in the region is lower than the state average. All counties have economies based on agriculture, which has a

significant number of part-time, seasonal and low-paying jobs. Many of the region's high-paying forest-products and metals production jobs have disappeared in recent years, replaced with lower paying jobs in trade and service industries.

Table 11. Median Household Income

County	Year 1999
Chelan	$37,316
Douglas	$38,464
Grant	$35,276
Kittitas	$32,546
Okanogan	$29,726
Washington State	*$44,776*

Source: U.S. Census Bureau, Profile of Selected Economic Characteristics: 2000.

Median household incomes in Kittitas and Okanogan Counties are among the lowest in the state (34th and 38th, respectively, out of 39 counties), while Chelan, Douglas and Grant Counties have household incomes roughly in the middle of the pack. The state's median household income is highly influenced by the high-paying aerospace and high-tech jobs in Puget Sound.

Employment and Industry

Agriculture, manufacturing and government are the primary sectors of the Region 7 economy. Tree fruit production and affiliated industries such as cold storage and food processing have the largest number of jobs in the region. The region has significant employment in forest products industries, although they have experienced restructuring and contraction in recent years. Manufacturing in some areas is diversifying, especially in Grant County. Government provides a stabilizing force in a regional economy subject to the swings of national and international markets.

Below are brief descriptions of the economy and employment in the region's five counties.

Chelan and Douglas Counties

Chelan and Douglas Counties are among the most important in Washington agriculture, especially related to employment. The agriculture sector in these counties employed about 11,440 persons in 2000, more than any other economic sector.

The tree fruit industry heavily influences their economies. Apples were the most valuable agricultural commodity in Washington in 2001. While the state is the largest

producer nationwide of apples, cherries, and pears, Region 7 is the top producer of these tree fruits. Sixty-four percent of all agricultural employment in Chelan County, and 76 percent in Douglas County, is in tree fruit.

In the manufacturing sector, food processing is a major employer in Chelan County. Most jobs are in producing canned, dehydrated, and frozen fruits. Aluminum has been a large industry in Chelan County; in 2000, 32 percent of the county's manufacturing employment was in smelting. Douglas County has a small manufacturing sector, just over 2 percent of employment, the bulk of which is in industrial machinery,

Overall, the manufacturing sector is declining in the two counties. International markets and rising energy costs are among factors precipitating the decline. A permanent layoff in July 2001 at Alcoa's Wenatchee Works aluminum smelter caused the lion's share of the downturn. International competition in recent years has not been kind to the fruit packing industry.

While the two counties are attempting to diversify beyond agriculture and manufacturing, their economies will continue to be shaped largely by these two sectors.

The trade sector is the largest non-farm employer in the two counties; 31 percent of non-farm jobs are in trade, compared to 24 percent statewide. About 84 percent of wholesale trade employment is in nondurable goods, primarily fresh fruit and vegetables. Eating and drinking establishments are the most common retail trade industry, and the second poorest paid.

Jobs in the services sector have grown faster than any other economic sector; it has about one in four non-farm jobs. In Chelan County, about 44 percent of employment in this sector is in the health services industry, with lodging being the second largest industry. In Douglas County, health services is the largest industry, followed by the amusement and recreation industry.

Government accounts for 23 percent of non-farm employment. In Douglas County, government provides one of every three jobs overall. Local government is the largest component (89 percent in Chelan County, 77 percent in Douglas County) of this sector; the majority of local government employment is in K-12 education.

Unemployment has been a problem in Chelan and Douglas Counties; their unemployment rates have been 20 percent or more above the statewide average during the past several years, leading to their designation as distressed counties in 2003. Contributing to this designation are that the largest economic sectors in these counties – agriculture, trade, and services – traditionally pay lower wages and have large amounts of part-time work.

(Note: The State Employment Security Department combined its description of these counties' economies in its September 2002 profile of the counties.)

Grant County

Agriculture dominates Grant County's economy. Located in the productive farmland of the Columbia Basin, the county has extremely fertile land and a vast irrigation network thanks to the Grand Coulee Dam. Production is diverse, ranging from apples and cherries to wheat to potatoes and other vegetables.

Agriculture is the largest employer in the Grant County, providing nearly one in four jobs. In addition, agriculture is the force behind several other industries including food processing, trucking and warehousing, and much of the county's wholesale trade. Taken together, these industries employ more than 40 percent of the county's workers.

The economic impact of agriculture goes beyond employment numbers, as some of the most important crops such as wheat use relatively little labor. While there is substantial wheat grown in Grant County (it ranks fifth in the state), tree fruits and potatoes play a much larger role. The county is among top producers of corn, green peas, hay, and livestock. The bulk of tree fruit production is apples, but cherries, apricots, pears, peaches, nectarines, and plums are grown.

The market value of crops grown in Grant County in 1997 was more than $804 million, ranking it second in the state behind Yakima County, and 14th in the nation, according to the 1997 Census of Agriculture.

Government is the second largest economic sector in Grant County, with more than 27 percent of non-farm employment. Nearly five of every six government jobs are in local government, primarily K-12 education, hospitals, and public utilities. This sector provides an element of stability to the economy as well as relatively high-paying jobs.

The trade sector is diverse, accounting for one of every four non-farm jobs. Farm and garden machinery account for the most jobs in wholesale durable goods. In nondurable goods, wholesale trading of farm supplies and fruits and vegetables provide the most employment. Retail trade has greater employment, particularly in eating and drinking places and grocery stores, than wholesale trade.

Manufacturing has about 20 percent of non-farm jobs in Grant County. The sector has diversified beyond food processing, although production of frozen fruits and vegetables and dehydrated fruits and vegetables remains the largest industry in the sector. Other industries produce farm machinery, publications, fabricated metals, components for computer chips, and navigational instruments.

There has been strong diversification in the manufacturing sector in recent years, as stated above. Employment growth in the emerging industries has increased at a faster rate than in food processing, the largest industry in the sector.

The services sector provides 18 percent of non-farm jobs, with health care the largest industry.

Grant County has been classified as a distressed county for the past several years, as its unemployment rate has been at least 20 percent greater than the state average, most recently for the 2000-2002 period.

Kittitas County

The first European settlers to arrive in Kittitas County in the early 1860s brought the seeds of many of natural resource-based industries important to the county today – livestock raising, crop farming, dairying, logging and lumber processing.

These industries provide significant employment to the county's economy. Agriculture in the rich Kittitas Valley is thriving, accounting for 7 percent of jobs in 2000. Within the county's agricultural sector, the largest employment concentration is in crop production, including tree fruits, oats, hay, and potatoes. Kittitas County is the largest producer of oats and hay in the state, and it is home to a large number of cattle, both beef and dairy.

The services and trade sectors account for 46 percent of non-farm employment in Kittitas County. The largest industries in the services sector are health care, followed by amusement and recreation services, and social services. The largest industries in trade are farm and ranch products at the wholesale level, and eating and drinking establishments and grocery stores at the retail level. The bulk of workers are employed in relatively low-paying industries, such as restaurants, food stores, tourist and recreation related industries.

The county's largest economic sector is government. This sector provides stability to from a large number of relatively secure and relatively well-paid jobs. The government sector employs 31 percent of all non-farm workers in Kittitas County, significantly higher than the sector's 17 percent share statewide. Central Washington University at Ellensburg boosts state government employment, which accounted for nearly one half of all government employment in the county. Local government provides 48 percent of all government jobs, most of which are in K-12 education. At the federal government level, the U.S. Army's Yakima Training Center provides training and logistics support to variety of military and federal civilian agencies.

The manufacturing sector, providing less than 6 percent of the county's jobs, is driven by natural resource industries; largest manufacturing employment is in food processing, followed by lumber and wood products.

In recent years, there has been relatively good job growth in the county; a considerable number of residents commute outside the county, mainly to Seattle. Because of this, Kittitas County is no longer on the state list of economically distressed counties as its unemployment situation is much closer to the state as a whole.

Okanogan County

As with many of the other counties in this region, the largest economic sector in Okanogan County is agriculture. About one in four jobs in the county is in agriculture

and related industries; most jobs are in crop production, primarily apples and cherries. Okanogan County is the fifth largest producer of apples in the state, third in pears, sixth in cattle, seventh in cherries, ninth in hay.

While apple production is prominent, it faces stiff competition internally from crops such as cherries and externally from countries with lower labor costs. Some agriculture related industries in the trade sector such as the food processing recently have seen difficult times. Livestock production, though still a substantial part of the county's economy, has shrunk from its peak at the turn of the 20th century.

The manufacturing sector – particularly lumber and wood products industries – is not as robust as it once was, yet it continues to provide a relatively large number of jobs that pay greater than average wages. The county is two-thirds is forest, and lumber and wood products industries provide nearly three of every four jobs in this sector. The local forest industries suffered some employment contraction in the 1990s due to industry restructuring and timber lockups to preserve habitat for endangered species.

The trade and services sectors constitute a growing part of Okanogan County's employment picture, providing an increasing number of jobs. Trade employment increased by 61 percent from 1970 to 2000 to become the second largest non-farm employer in county. One of the biggest industries in the sector is fruit packing. Wholesale trade is 30 percent of sector, nearly all in wholesale fresh fruit and vegetables. Retail trade is 70 percent of employment in the sector, with eating and drinking places providing the most work.

Services is the second largest non-farm sector of the county's economy. The two largest industries in this sector are health services and membership organizations (Okanogan and Colville Tribal administration). The county has a growing tourism and recreation industry, with lodging contributing a significant number of jobs to this sector.

The largest non-farm sector of the economy is government, providing nearly one of every three jobs. It is the second largest employer beyond agriculture, primarily because of state and federal management of forests, parks, and dams, and regulatory oversight of farming. Local government makes up the bulk of employment in this sector, about three quarters, with half of that in K-12 education.

Commuting Patterns[6, 7]

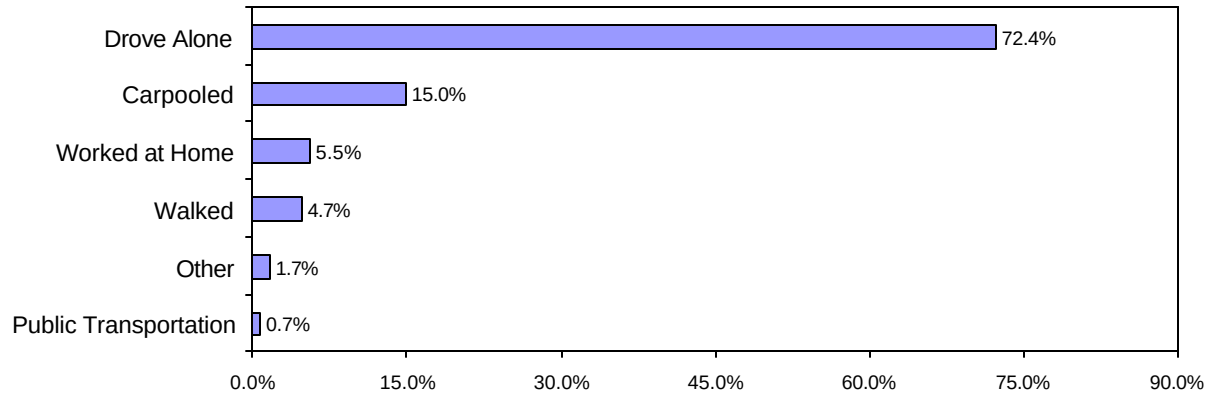
Recent population growth has resulted in a significant increase in workers, automobiles and trucks on the roads. A higher percentage of workers driving alone can cause traffic congestion and accidents. More traffic places a larger load on the region's transportation infrastructure. The impact of an emergency can disrupt automobile traffic, shut down transit systems, and make evacuations more difficult.

A percentage of the workers in three of the region's five counties commute outside their county of residence to jobs. More than half the workers in Douglas County commute to jobs in Chelan County; about 10 percent of Chelan workers drive to Douglas County for

work. Kittitas County sends commuters two directions – about 10 percent of its workers drive across Snoqualmie Pass to jobs in King County, while another 5 percent drive to Yakima County to work.

Figure 1, below, shows transportation used by commuters. Primary mode of transportation is driving alone. Public transportation systems carried about 1.1 million passengers in Chelan, Douglas and Grant Counties, primarily on rural, intercity routes.

Figure 1. Commuting Patterns



Source: U.S. Census Bureau, Profile of Selected Economic Characteristics: 2000

Hazards and State Facilities Potentially At-Risk

The regional hazard profiles were developed using information from the individual hazard profiles that are part of the Risk Assessment, as well as from reference documents listed at the end of each hazard profile.

Unless otherwise noted below, at-risk facilities were identified by state agencies participating in this plan using methodology identified in the Risk Assessment Introduction, Tab 7.

Figures for the number of staff/visitors/residents for each at risk facility were calculated on the highest use for that facility; for many structures, this inflates the number of individuals in the buildings at any one time.

The Washington Department of Transportation identified essential transportation corridors, or highways and ferry routes of greatest importance to transportation of people and goods and services.

Region 7

Hazard: Avalanche

Characteristics	Most Vulnerable Areas	Event History	Probability
Avalanches occur when a layer of snow loses its grip on a slope and slides downhill. They occur frequently in the backcountry of the Cascade Range, often without any impact to people, transportation routes or development. Most avalanches that cause injuries or deaths occur outside developed recreation areas; the primary cause of these avalanches is the weight of the victim or someone in the victim's party on the slab of snow. Very few avalanche fatalities occur on open runs in ski areas or on highways. Avalanche season begins in November and runs through early summer for all mountain areas of the state; in high alpine areas of the Cascade Range, the season is year-round.	1. Recreation areas in the Cascade Mountains. 2. Snoqualmie Pass, Interstate 90. 3. Blewett Pass, US Highway 97. 4. Stevens Pass and Tumwater Canyon, US Highway 2 5. State Route 20 – North Cascades Highway.	Avalanches in Region 7 since 1910 that resulted in fatalities occurred in 1971 (four deaths), 1994 (one death), 1998 (one death), 2001 (two deaths), and 2003 (one death).	On average, avalanches kill one to two people every year in Washington State. Nine avalanche deaths have occurred in Region 7 since 1910.

Hazard: Avalanche **At Risk Population:** Unknown of 246,393 **PRELIMINARY ASSESSMENT**

State Agency Structures At Risk Number and Function of Buildings	No. of Affected Staff / Visitors / Residents	Approx. Value of Owned Structures	Approx. Value of Contents All Buildings
Total at-risk buildings: No state buildings, four state highways.	0	0	0

Function of at-risk buildings: Four state highways Four state highways considered emphasis corridors because of their importance to movement of people and freight are potentially at risk to avalanche:

1. Interstate 90 at Snoqualmie Pass.
2. U.S. Highway 2 at Stevens Pass and Tumwater Canyon.
3. U.S. Highway 97 at Blewett Pass.
4. State Route 20 – North Cascades Highway. The highway is closed every winter but it experiences residual avalanche problems in the spring after it is reopened.

Total at-risk critical facilities: No state buildings, four state highways.	0	0	0

Function of at-risk critical facilities: Four state highways considered emphasis corridors because of their importance to movement of people and freight are potentially at risk to avalanche:

1. Interstate 90.
2. U.S. Highway 2.
3. U.S. Highway 97.
4. State Route 20 – North Cascades Highway

Hazard: Drought

Characteristics	Principal Sources	Event History	Probability
Drought is a prolonged period of dryness severe enough to reduce soil moisture, water and snow levels below the minimum necessary for sustaining plant, animal, and economic systems. Drought can have a widespread impact on the environment and the economy, depending upon its severity, although it typically does not result in loss of life or damage to property, as do other natural disasters. In Region 7, drought conditions can reduce water available for irrigated crops and domestic and industrial use, as well as affect the availability and cost of power for local industries.	Drought is the result of many causes, often synergistic in nature; these include global weather patterns that produce persistent, upper-level high-pressure systems along the West Coast with warm, dry air resulting in less precipitation.	During 1895-1995, much of the state was in severe or extreme drought at least 5 percent of the time. Region 7 was in severe or extreme drought from 10 to 15 percent of the time during this period. 1977 Drought – This region experienced severe or extreme drought conditions from 30 percent to more than 50 percent of the time during this event. 2001 Drought – At the height of the event in this region in August 2001, much of this region experienced moderate to extreme drought conditions.	In temperate regions of the world, including Washington state, current long-range forecasts of drought have limited reliability. Meteorologists do not believe that reliable forecasts are attainable any more than a season in advance. Drought conditions of at least moderate severity occur every few years in Washington. On a long-term basis, Region 7 experiences drought conditions of at least moderate severity from 10 to 15 percent of the time.

Hazard: Drought **At Risk Population:** Unknown of 246,393 **PRELIMINARY ASSESSMENT**

State Agency Structures At Risk Number and Function of Buildings	No. of Affected Staff / Visitors / Residents	Approx. Value of Owned Structures	Approx. Value of Contents All Buildings
Total at-risk buildings: State Agency identified – 32 (28 owned, four leased)	3,915	$5,736,894	$7,742,123
Function of at-risk buildings: Included in state facilities at risk to direct or indirect impact of drought are buildings on the campus of Big Bend Community College and local offices of the University of Washington.			
Total at-risk critical facilities: No state facilities.	0	0	0

Region 7

Hazard: Earthquake

Characteristics	Principal Sources	Event History	Probability
In general, Seismic Hazard Areas in Region 7 are found in: Floodplains and the adjacent bluffs in the Chiwawa, Chewuch, Columbia, Entiat, Mad, Methow, Okanogan, Wenatchee, White and Yakima River valleys because of their high or medium susceptibility to liquefaction and other ground failures. Shorelines of large lakes such as Banks Lake and Lake Chelan because of their susceptibility to landslides and other ground failures and to landslide-caused tsunamis.	1. Interplate earthquake in the offshore Cascadia Subduction Zone. Evidence of quakes with magnitude greater than 8 have been found along the Washington coast; the most recent event was about 1700. 2. Shallow, crustal earthquake in the North America (continental) plate. Information is limited on surface faults in Region 7, although the state's largest earthquake on a surface fault was the 1872 magnitude 6.8 event near Lake Chelan. 3. Deep, Benioff zone earthquake within the Juan de Fuca plate. This is the source for the 1949, 1965, and 2001earthquakes.	1872 – The magnitude 6.8 Lake Chelan earthquake caused extensive landslides in shorelines of the Columbia River; one blocked the river for several hours. It caused numerous ground failures in the Chelan-Wenatchee area and landslides throughout the Cascades. Since 1970, earthquakes of magnitude 4.0 or greater whose epicenter was in Region 7 occurred in 1974 (M4.7), 1981 (M4.6, M5.0), 1989 (M4.5), and 1997 (M4.6). Region 7 was part of the Presidential Disaster Declaration for the M6.8 Nisqually earthquake in 2001.	Approximate recurrence rate for a magnitude 9 earthquake in the Cascadia Subduction Zone is once every 350 to 500 years. Approximate recurrence rate for earthquakes similar to the 1965 magnitude 6.5 Seattle-Tacoma and 2001 magnitude 6.8 Nisqually events is once every 35 years. Approximate recurrence rate for earthquakes similar to the 1949 magnitude 7.1 Olympia event is once every 110 years. Geologists have uncovered evidence of a number of surface faults in Eastern Washington, but have not yet determined how often they generate earthquakes, their magnitude, and the risk they pose to the public.

Hazard: Earthquake **At Risk Population:** Unknown of 246,393 **PRELIMINARY ASSESSMENT**

State Agency Structures At Risk Number and Function of Buildings	No. of Affected Staff / Visitors / Residents	Approx. Value of Owned Structures	Approx. Value of Contents All Buildings
Total at-risk buildings: State Agency identified – 120 (60 owned, 60 leased)	5,670	$25,010,476	$26,555,422

Function of at-risk buildings: Included are the following:

- Campus of Big Bend Community College.
- Local detachments, highway weigh scales, and communication facilities of the Washington State Patrol.
- About 50 general office and client service offices that include those serving individuals and families on public assistance, providing employment and training services, driver licensing, and liquor sales.

Four state highways considered emphasis corridors because of their importance to movement of people and freight are potentially at risk to earthquake:

1. Interstate 90.
2. U.S. Highway 2.
3. U.S. Highway 97.
4. State Route 20 – North Cascades Highway.

Total at-risk critical facilities: State Agency identified – 45 (34 owned, 11 leased)	873	$6,226,502	$9,178,857

Function of at-risk critical facilities: Included are the following:

- Local detachments, highway weigh scales, and communication facilities of the Washington State Patrol.
- General office and client service offices that include those serving individuals and families on public assistance, providing employment and training services, driver licensing, and liquor sales.

Four state highways considered emphasis corridors because of their importance to movement of people and freight are potentially at risk to earthquake:

1. Interstate 90.
2. U.S. Highway 2.
3. U.S. Highway 97.
4. State Route 20 – North Cascades Highway.

Hazard: Flood

Characteristics	Principal Flood Sources	Event History	Probability
Region 7 is subject flooding that occurs on the region's major river systems (see right) as well as flash flooding. Because of their origins in upper elevations, these rivers are influenced by snow and rain patterns in the Cascade Mountains, as well as thunderstorms that cause flash flooding on both frozen and dry ground. Primary flood season is during spring runoff in May and June, although riverine floods can occur during winter months. Flash flooding can occur throughout the year.	1. Entiat River 2. Methow River 3. Okanogan River 4. Wenatchee River 5. Yakima River	Flooding in Region 7 is a common event. Since 1956, flooding resulted in Presidential Disaster Declarations in 1957, 1963, 1964, 1972, 1975, 1977, 1990, 1995, 1996, and 2003. Since 1989, more than $6.5 million in Stafford Act disaster assistance has been provided to Region 7 for repairs to public facilities following flood events. Kittitas County accounted for about a third of the assistance, followed by Chelan, Douglas, and Okanogan Counties.	The region's major rivers typically flood every two to five years. Since 1956, this region has experienced serious flooding resulting in major damage and a Presidential Disaster Declaration about every five years. Only Grant (3.0 percent) and Kittitas (1.8 percent) Counties have a significant percentage of their area in the 100-year floodplain.

Hazard: Flood **At Risk Population:** est. 65,850 of 246,393 **PRELIMINARY ASSESSMENT**

State Agency Structures At Risk Number and Function of Buildings	No. of Affected Staff / Visitors / Residents	Approx. Value of Owned Structures	Approx. Value of Contents All Buildings
Total at-risk buildings: State Agency identified – 33 (28 owned, five leased)	4,032	$7,503,497	$8,588,688

Function of at-risk buildings: Included are the campus of Big Bend Community College and four general office and client services offices.

Four state highways considered emphasis corridors because of their importance to movement of people and freight are potentially at risk to flood where they cross or run through floodplains:

1. Interstate 90.
2. U.S. Highway 2.
3. U.S. Highway 97.
4. State Route 20 – North Cascades Highway.

Total at-risk critical facilities: State Agency identified – 2 (both leased)	56	0	$554,589

Function of at-risk critical facilities: Client services offices.

Four state highways are potentially at risk to flood where they cross or run through floodplains:

1. Interstate 90.
2. U.S. Highway 2.
3. U.S. Highway 97.
4. State Route 20 – North Cascades Highway.

Region 7

Hazard: Landslide

Characteristics	Principal Sources	Event History	Probability
Region 7 is part of three landslide provinces. Cascade Range province – The valley walls north of Snoqualmie Pass have areas of small rock falls, but relatively few landslides otherwise. South of Snoqualmie Pass, peaks are lower and consist of predominantly volcanic rock; earth flows and block slides in bedrock are the most common types of landslides in this area. Columbia Plateau province – This landslide province has extensive layers of sediments between, intermingling with, and overlaying basalt flows. Landslides in this province include slope failures in bedrock and landslides in overlying sediments. Irrigation compounds the province's landslide problems. Okanogan Highlands province – This landslide province extends from the slopes of the North Cascades in the west to the Selkirk Mountains in the northeast corner of the state. Primary slope stability problems in this province are in the sediments within and along the boundary of the highlands.	1. Bluffs along shorelines of river valleys and large lakes. 2. Slopes of the Cascade range.	1872 – The magnitude 6.8 Lake Chelan earthquake caused extensive landslides in shorelines of the Columbia River; one blocked the river for several hours. It also caused numerous other ground failures in the area around Chelan. 1996 – Two landslides in the February Storm and Landslides Disaster blocked two state highways. A large rockslide reactivated by heavy rainfall lead to extensive erosion and damage to U.S. Highway 97 near Peshatin when it displaced a creek against the road fill. A moderate debris flow east of the Keechelus Lake dam blocked all lanes of Interstate 90 east of Snoqualmie Pass and closed the freeway for one day.	Ground failures that result in landslides have a number of contributing factors that do not allow for the development of a reasonable estimate probability of future events. Factors that contribute to ground failure and landslides include: • Local topography. • Erosion on slopes. • Saturation of slopes. • Earthquakes. • Volcanic deposits and debris flows. • Excess weight on weak slopes. • Human action that disturbs slopes.

Hazard: Landslide **At Risk Population:** Unknown of 246,393 **PRELIMINARY ASSESSMENT**

State Agency Structures At Risk Number and Function of Buildings	No. of Affected Staff / Visitors / Residents	Approx. Value of Owned Structures	Approx. Value of Contents All Buildings
Total at-risk buildings: State Agency identified – 2 (both leased)	43	$182,776	$596,776

Function of at-risk buildings: Client services offices.

Four state highways considered emphasis corridors because of their importance to movement of people and freight are potentially at risk to landslide as they cross steep slopes:

1. Interstate 90.
2. U.S. Highway 2.
3. U.S. Highway 97.
4. State Route 20 – North Cascades Highway.

Total at-risk critical facilities: State Agency identified – 1 (leased)	39	0	$351,000

Function of at-risk critical facilities: Client services office.

Four state highways considered emphasis corridors because of their importance to movement of people and freight are potentially at risk to landslide as they cross steep slopes:

5. Interstate 90.
6. U.S. Highway 2.
7. U.S. Highway 97.
8. State Route 20 – North Cascades Highway.

Hazard: Severe Storm

Characteristics	Principal Sources	Event History	Probability
A severe storm is an atmospheric disturbance that results in one or more of the following phenomena: strong winds and large hail, thunderstorms, tornados, rain, snow, or other mixed precipitation. Most storms move into Washington from the Pacific Ocean. Typically, major impacts from a severe storm are to transportation and loss of utilities.	1. High winds 2. Winter storm 3. Blizzard 4. Dust storms 5. Severe thunderstorm 6. Tornado	Severe storm in Region 7 is a common event. Since 1956, severe storm events resulted in Presidential Disaster Declarations in 1972, 1977, 1990, 1995, and 1996. Since 1989, Region 7 received more than $3.7 million in Stafford Act disaster assistance for repairs to public facilities following severe storm events. Chelan County received about two-thirds of the assistance, with Grant County receiving the bulk of the remaining third.	Projected recurrence rates for the severe storm events to which Region 7 is most vulnerable are as follows: • High wind events occur at least once a year in Kittitas County. • Winter storms occur about at least once a year in Douglas, Kittitas and Okanogan Counties, and about once every two years in Grant County. • Blizzards occur in Douglas, Grant, Kittitas and Okanogan Counties; a recurrence rate is not available. • Dust Storms occur about once every 10 years in the region. • Severe Thunderstorms occur about once every two years in the region. • Tornados occur about once every 10 years in Grant and Okanogan Counties.

Hazard: Severe Storm **At Risk Population:** 246,393 of 246,393 **PRELIMINARY ASSESSMENT**

State Agency Structures At Risk Number and Function of Buildings	No. of Affected Staff / Visitors / Residents	Approx. Value of Owned Structures	Approx. Value of Contents All Buildings
Total at-risk buildings: State Agency identified – 95 (60 owned, 35 leased)	4,714	$20,159,684	$19,495,190

Function of at-risk buildings: Included are the following:

- Campus of Big Bend Community College.
- Local detachments, highway weigh scales, and communication facilities of the Washington State Patrol.
- About 24 general office and client service offices that include those serving individuals and families on public assistance, providing employment and training services, driver licensing, and liquor sales.

Total at-risk critical facilities: State Agency identified – 39 (34 owned, five leased)	505	$6,226,502	$6,154,899

Function of at-risk critical facilities: Included are the following:

- Local detachments, highway weigh scales, and communication facilities of the Washington State Patrol.
- General office and client service offices.

Hazard: Tsunami

Characteristics	Principal Sources	Event History	Probability
A tsunami resembles a series of quickly rising tides that withdraw with currents much like those of a river. Swift currents commonly cause most of the damage. A Pacific Ocean tsunami can affect the entire Pacific basin, while a tsunami in inland waters can affect many miles of shoreline. Tsunamis typically cause the most severe damage and casualties near their source. Waves are highest there because they have not yet lost much energy. Another class of damaging water wave is a seiche. A seiche is a wave generated in a body of water from the passage of seismic waves caused by earthquakes. Sedimentary basins beneath the body of water can amplify a seismic seiche and the natural sloshing action in a body of water or focus water waves onto a section of shoreline.	Tsunamis and seiches can be generated by a number of sources: 1. Distant earthquakes along the Pacific Rim (i.e., 1964 Alaska earthquake). 2. Local earthquakes, such as those generated by local surface faults; in the Benioff zone; or in the Cascadia Subduction Zone off the coast. 3. Large landslides into bodies of water, such as Lake Chelan or Banks Lake. 4. Submarine landslides in bodies of water.	None recorded in Region 7.	Geologists have uncovered evidence of a number of surface faults, but have not yet determined how often they generate earthquakes, their magnitude, and whether they could generate a tsunami or seiche in an enclosed body of water in Region 7.

Hazard: Tsunami **At Risk Population:** Unknown of 246,393 **PRELIMINARY ASSESSMENT**

State Agency Structures At Risk Number and Function of Buildings	No. of Affected Staff / Visitors / Residents	Approx. Value of Owned Structures	Approx. Value of Contents All Buildings
Total at-risk buildings: No state buildings.	0	0	0
Total at-risk critical facilities: No state buildings.			

Region 7

Hazard: Volcano

Characteristics	Volcanoes In Region	Event History	Probability
Region 7 is east of the state's five volcanoes. An eruption is likely to deposit tephra (ash) in at least part of the region. Volcanoes can lie dormant for centuries between eruptions. When Cascades volcanoes do erupt, high-speed avalanches of hot ash and rock called pyroclastic flows, lava flows, and landslides can devastate areas 10 or more miles away, while huge mudflows of volcanic ash and debris called lahars can inundate valleys more than 50 miles downstream. Falling ash from explosive eruptions can disrupt human activities hundreds of miles downwind, and drifting clouds of fine ash can cause severe damage to the engines of jet aircraft hundreds or thousands of miles away.	Region 7 is not home to any volcano. However, it could be affected by ash fall from any of the state's volcanoes: 1. Mount Baker 2. Glacier Peak 3. Mount Rainier 4. Mount St. Helens 5. Mount Adams	Mount St. Helens, 1980 – In the last 515 years, the volcano produced four major explosive eruptions and dozens of lesser eruptions. The May 18 eruption was the most destructive in the history of the United States. The volcano covered much of Region 7 in ash, posing temporary but major problems for transportation and for sewage-disposal and water-treatment systems. Due to reduced visibility, many highways and roads closed to traffic; Interstate 90 from Seattle to Spokane closed for a week. Sewage-disposal system pumps, filters, and other equipment receiving a half-inch or more of ash were damaged. Thick ash accumulation also destroyed crops.	Ash fall is the primary volcanic hazard in Region 7. Due to prevailing westerly winds, the possibility of an annual ash fall of one centimeter in Region 7 from any major Cascade volcano ranges from one in 1,000 to one in 10,000, depending on location. Mount Baker, Glacier Peak – There is less than 1 chance in 50,000 of an annual ash fall of 1 centimeter in parts of the region from either of these volcanoes. Mount Rainier – There is 1 chance in 10,000 of an annual ash fall of 1 centimeter in parts of Kittitas County. Mount St. Helens – There is a 1 in 1,000 to 1 in 10,000 chance of an annual ash fall of 1 centimeter in parts of the region. Mount Adams – There is 1 chance in 50,000 of an annual ash fall of 1 centimeter in the region.

Hazard: Volcano **At Risk Population:** Unknown of 246,393 **PRELIMINARY ASSESSMENT**

State Agency Structures At Risk Number and Function of Buildings	No. of Affected Staff / Visitors / Residents	Approx. Value of Owned Structures	Approx. Value of Contents All Buildings
Total at-risk buildings: State Agency identified – 1 (owned)	120	$1,259,720	$1,245,405

Function of at-risk buildings: Potentially impacted by ash fall from a volcanic eruption is the district headquarters of the Washington State Patrol.

Five state highways considered emphasis corridors because of their importance to movement of people and freight are potentially at risk to ash fall from volcanic eruptions:

1. Interstate 90
2. U.S. Highway 2
3. U.S. Highway 97
4. State Route 17
5. State Route 20

Total at-risk critical facilities: State Agency identified – 1 (owned)	120	$1,259,720	$1,245,405

Function of at-risk critical facilities: Potentially impacted by ash fall from a volcanic eruption is the district headquarters of the Washington State Patrol.

Five state highways considered emphasis corridors because of their importance to movement of people and freight are potentially at risk to ash fall from volcanic eruptions:

1. Interstate 90
2. U.S. Highway 2
3. U.S. Highway 97
4. State Route 17
5. State Route 20

Hazard: Wildland Fire

Characteristics	Principal Sources	Event History	Probability
Wildland fires are fires caused by nature or humans that result in the uncontrolled destruction of forests, brush, field crops, grasslands, and real and personal property in non-urban areas. A fire needs three elements in the right combination to start and grow – a heat source, fuel, and oxygen. How a fire behaves primarily depends on the characteristics of available fuel, weather conditions, and terrain. The wildland fire season in Washington usually begins in early July and typically culminates in late September with a moisture event. Drought, snow pack, and local weather conditions can expand the length of the fire season.	1. Humans – people start most wildland fires; from 1992 to 2001, people, on average, caused more than 500 wildland fires each year on state-protected lands. Human-caused fires burn an average of 4,404 state-protected acres each year. 2. Lightning – lightning on average started 135 wildland fires annually on state-protected lands during 1992-2001. Lightning-caused fires burn more state-protected acreage than any other cause, an average of 10,866 acres annually.	Many of the state's most significant wildland fires occurred in this region: 1929 – Toats Coulee fire burned 80,000 acres in Okanogan County. 1988 – The Dinkelman Fire in Chelan County burned 50,000 acres and resulted in one death. 1994 – Four fires in Chelan County burned 180,000 acres, destroyed 37 homes, and threatened another 2,700 homes. 2001 – The Rex Creek Complex/Virginia Lake Complex fires burned 130,000 acres, partly in the region. The fires threatened hundred of homes; 10 were destroyed. 2001 – The Thirtymile Fire in Okanogan County burned 9,300 acres and killed four firefighters. Among recent fires on state-protected lands: 2000 – Rocky Hull fire burned 9,404 acres and destroyed 37 homes in Okanogan County. 2001 – The Libby fire (Okanogan) and Union Valley fire (Chelan) burned more than 8,500 acres, threatened 150 homes, and destroyed three.	Nearly all of the state's significant wildland fires have occurred in Eastern Washington. Eastern Washington is more prone to catastrophic wildland fires than Western Washington – the east has both lighter fuels that burn more easily and more snags and hazard trees, and weather conditions more favorable to fire (thunderstorms with dry lightning are more prevalent in the east). Also, the east has a longer fire season than the western half of the state – the west receives more rainfall, has wetter and cooler spring seasons, and is more urbanized.

Hazard: Wildland Fire **At Risk Population:** est. 24,753 of 246,393 **PRELIMINARY ASSESSMENT**

State Agency Structures At Risk Number and Function of Buildings	No. of Affected Staff / Visitors / Residents	Approx. Value of Owned Structures	Approx. Value of Contents
Total at-risk buildings: State Agency identified – 102 (58 owned, 44 leased)	5,097	$23,461,062	$23,674,260

Function of at-risk buildings: Included are the following:

- Campus of Big Bend Community College.
- Local detachments, highway weigh scales, and communication facilities of the Washington State Patrol.
- About 30 general office and client service offices that include those serving individuals and families on public assistance, providing employment and training services, driver licensing, and liquor sales.

Total at-risk critical facilities: State Agency identified – 41 (owned-leased split not available)	707	$6,232,757	$9,139,555

Function of at-risk critical facilities: Included are the following:

- Local detachments, highway weigh scales, and communication facilities of the Washington State Patrol.
- General office and client service offices.

[1] *Chelan and Douglas County Profile*, Washington Department of Employment Security, Labor Market and Economic Analysis Branch, September 2002.

[2] *Ibid*.

[3] *Adams and Grant County Profile*, Washington Department of Employment Security, Labor Market and Economic Analysis Branch, December 2002.

[4] *Kittitas County Profile*, Washington Department of Economic Security, Labor Market and Economic Analysis Branch, December 2002.

[5] *Okanogan County Profile*, Washington Department of Economic Security, Labor Market and Economic Analysis Branch, September 2002.

[6] *Profile of Selected Economic Characteristics: Census 2000*, U.S. Census Bureau.

[7] *Summary of Public Transportation 2001*, Washington State Department of Transportation, November 2002 (Revised April 2003).